UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,342	03/03/2004	Abaneshwar Prasad	100082DIV3	4543

29050 7590 01/31/2006

STEVEN WESEMAN
ASSOCIATE GENERAL COUNSEL, I.P.
CABOT MICROELECTRONICS CORPORATION
870 NORTH COMMONS DRIVE
AURORA, IL 60504

EXAMINER	
VO, HAI	

ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/792,342	PRASAD, ABANESHWAR	
	Examiner	Art Unit	
	Hai Vo	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The art rejections over Winings (US 4,239,567) in view of Perman et al (US 5,670,102) are withdrawn in view of Applicant's arguments in the 11/03/2005 amendment (second paragraph, page 3).
2. The art rejections over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) are withdrawn because as nonanalogous art, Perman is not pertinent to the particular problem with which the applicant was concerned. Therefore, Perman is improperly combinable with Xu to achieve the claimed invention.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-11, 13 and 14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Perman et al (US 5,670,102) as evidenced by Spitler et al (US 6,166,109). Perman teaches a microcellular polyurethane having a cell density greater than 10^9 voids/cm3, void

volume from 5 to 97% and cell size from 10 to 200 microns (column 2, lines 30-40, column 5, lines 15-25). The microcellular material can be made from a polymer blend of thermoplastic polymers and copolymers such as polyvinyl alcohol, which reads on Applicant's water absorbent polymer (column 4, lines 5-8, column 6, lines 15-30). The microcellular has closed cells (column 5, lines 35-36). The thermoplastic polymer has a glass transition temperature below 150°C (claim 3). There is no teaching or suggestion that the microcellular polyurethane contains abrasive particles and has externally produced surface texture. Perman does not specifically disclose the syntactic foam having a bimodal cell size distribution. However, Perman teaches the use of hollow microspheres in the syntactic foam and it has been shown in the prior art that the use of hollow microspheres in syntactic foams to produce a bimodal cell structure as evidenced by Spitler et al (US 6,166,109). Therefore, the foam of Perman would substantially inherently have a bimodal cell structure. Perman does not teach the microcellular polyurethane can be used to polish a silicone wafer at a rate of at least 600 A/min with a carrier down force pressure of about 0.028Mpa, a slurry flow rate of about 100 ml/min, a platen rotation speed of about 60 rpm and a carrier rotation speed of about 55 rpm to about 60 rpm. However, it appears that the microcellular polyurethane meets all the structural limitations as required by the claims. The microcellular polyurethane contains no abrasive particles, having no externally produced surface texture and cell density, void volume, cell size within the claimed ranges. The microcellular is made from a polymer blend and

has close cells. Therefore, it is not seen that the microcellular polyurethane would have performed differently than the polyurethane polishing pad of the present invention when the microcellular polyurethane is used to polish the silicon dioxide. The same token is applied to the flexural modulus, rheology processing index, glass transition temperature, melt transition temperature and % compressibility and shore D hardness. This is in line with ***In re Spada***, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties. Accordingly, Perman anticipates or strongly suggests the claimed subject matter.

6. Claims 1-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer et al (US 6,709,565) in view of Xu et al (US 6,406,363). Mayer teaches a non-abrasive electropolishing pad having a pore size between 0.02 to 10 microns and void volume from 20 to 80% (claims 8, 9 and 20). There is no suggestion that the electropolishing pad having no externally produced surface texture. Mayer does not teach the cell density. However, it appears that the pad has a pore size and void volume within the claimed ranges and the cell density is dictated by the pore size and void volume. Therefore, it is not seen that the cell density could have been outside the claimed range as the pore size and void volume are within the claimed ranges. It is the examiner's position that the cell density would be inherently present. The reciting "the polishing pad has a void volume of about 5% or less" means that the polishing pad could have a void volume down to zero. As such, the void volume limitation is not necessarily

required by claim 3. Mayer does not specifically teach the polyurethane polishing pad. Xu teaches a polishing pad comprising a microcellular polyurethane having a cell size from 0.1 to 1000 microns (column 4, lines 26-27). Xu teaches the microcellular polyurethane having closed cells. Xu teaches that the chemical solution contains no abrasive particles (column 3, lines 32-35). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ polyurethane foam as a polishing pad of Mayer because it has been shown in the art that polyurethane is widely used as a polishing pad.

It appears that the foam of Mayer as modified by Xu meets all the structural limitations as required by the claims. The resulting foam contains no abrasive particles and comprises no externally produced surface texture. The resulting foam comprises a polymeric resin as required by the claims. The resulting foam has the cell size, void volume within the claimed ranges. Therefore, it is not seen that the polyurethane polishing pad would have performed differently than the claimed polishing pad in terms of the compressibility, rebound property, hardness and polishing performance, i.e., polishing the silicon dioxide wafer at a rate of at least 600 A°/min with a carrier down force pressure of 0.028 Mpa, a slurry flow rate of 100 ml/ml, a platen rotation speed of about 60 rpm, and a carrier rotation speed of about 55 rpm to about 60rpm. It seems from the claim, if one meets the structure recited, the properties must be met or Applicant's claim is incomplete. This is in line with ***In***

re Spada, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties. The same token is applied to the flexural modulus, rheology, glass transition temperature and melt transition temperature of the polyurethane. Like material has like property. It is the examiner's position that the flexural modulus, rheology, glass transition temperature and melt transition temperature would be inherently present. This is also in line with ***In re Spada***, 15 USPQ 2d 1655 (1990).

7. Claims 1-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of WO 01/96434. US 6,777,455 to Seyanagi et al is relied on as an equivalent form of WO 01/96434. Xu teaches a polishing pad comprising a microcellular polyurethane having a cell from 0.1 to 1000 microns encompassing the claimed range (column 4, lines 26-27). Xu teaches the microcellular polyurethane having closed cells. Xu teaches that the chemical solution contains no abrasive particles, the polishing pad needs to include abrasive particles (column 3, lines 32-35). Xu teaches the slurry contains abrasive particles (column 3, lines 18-20). Therefore, the abrasive particles are not necessarily contained in the polishing pad itself. Xu discloses the polishing surface is smooth or textured (column 5, line 31). Likewise, the foam has no surface textures. The polishing pad further comprises a thermoplastic polymer (column 4, lines 10-15). Xu does not specifically disclose the cell density of the microcellular polyurethane. Seyanagi, however, teaches a polishing pad made from a cellular polyurethane foam having a density of 0.8 g/cm3, hardness D of

56 and cell diameter from 30 to 40 microns (example 1). Since the cell density and void volume are dictated by the foam density, hardness and cell diameter, therefore, it is not seen that the cell density and void volume could be outside the claimed ranges as the foam density, hardness and cell diameter are within the claimed ranges. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the cellular polyurethane foam of Seyanagi as the foam pad of Xu motivated by the desire to provide a polishing pad having more finely and uniform cells, and higher hardness.

It appears that the foam of Xu as modified by Seyanagi meets all the structural limitations as required by the claims. The resulting foam contains no abrasive particles and comprises no externally produced surface texture. The resulting foam comprises a polymeric resin as required by the claims. The resulting foam has the cell size encompassing the claimed range. The resulting foam has a cell size, hardness, foam density within the claimed ranges. Therefore, it is not seen that the polyurethane polishing pad would have performed differently than the claimed polishing pad in terms of the compressibility, rebound property, hardness and polishing performance, i.e., polishing the silicon dioxide wafer at a rate of at least 600 A°/min with a carrier down force pressure of 0.028 Mpa, a slurry flow rate of 100 ml/ml, a platen rotation speed of about 60 rpm, and a carrier rotation speed of about 55 rpm to about 60rpm. It seems from the claim, if one meets the structure recited, the

properties must be met or Applicant's claim is incomplete. This is in line with ***In re Spada***, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties. The same token is applied to the flexural modulus, rheology, glass transition temperature and melt transition temperature of the polyurethane. Like material has like property. It is the examiner's position that the flexural modulus, rheology, glass transition temperature and melt transition temperature would be inherently present. This is also in line with ***In re Spada***, 15 USPQ 2d 1655 (1990).

8. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of WO 01/96434 as applied to claim 1 above, further in view of Ogawa et al (US 6,790,883). Xu does not specifically disclose the polishing pad comprising a water-soluble polymer such as cross-linked polyacrylic acid. Ogawa, however, teaches a polishing pad comprising a polyacrylic acid and a cross-linking agent. Since polyacrylic acid is cross-linkable, therefore, it is not seen that the polyacrylic acid is not cross-linked in the presence of the cross-linking agent. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the water-soluble polymer in the polishing pad motivated by the desire to increase an indentation hardness of the polishing pad, thereby improving the removal rate (Ogawa, column 6, lines 16-25).
9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of in view of WO 01/96434 as applied to claim 1 above,

further in view of Kihara et al (US 6,239,188). Xu does not specifically disclose the polyurethane foam having a bimodal pore size distribution. Kihara, however, teaches a polishing pad made from polyurethane comprising two types of cells having different sizes by adding two types of expanded microspheres with two different particle sizes (abstract). The formation of the two type of cells leads to a large amount of abrasive grains from the slurry to held on the polishing pad, thereby improving polishing performance while reducing scratching of the polished surface (column 5, lines 1-7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the microcellular foam having a bimodal pore size distribution motivated by the desire to improve polishing performance and reduce scratching of the polished surface.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on Monday through Friday, from 6:00 to 2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hai Vo

HV

HAI VO
PRIMARY EXAMINER